



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,241	06/06/2006	Shengzhong Zhang	US030488US	3990
24737 7590 11/28/2007 PHILIPS INTELLECTUAL PROPERTY & STANDARDS P.O. BOX 3001 BRIARCLIFF MANOR, NY 10510			EXAMINER KIKNADZE, IRAKLI	
			ART UNIT 2882	PAPER NUMBER
			MAIL DATE 11/28/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/596,241	ZHANG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Irakli Kiknadze	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 June 2006 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/01/2007 has been entered.

### ***Claim Rejections - 35 USC § 103***

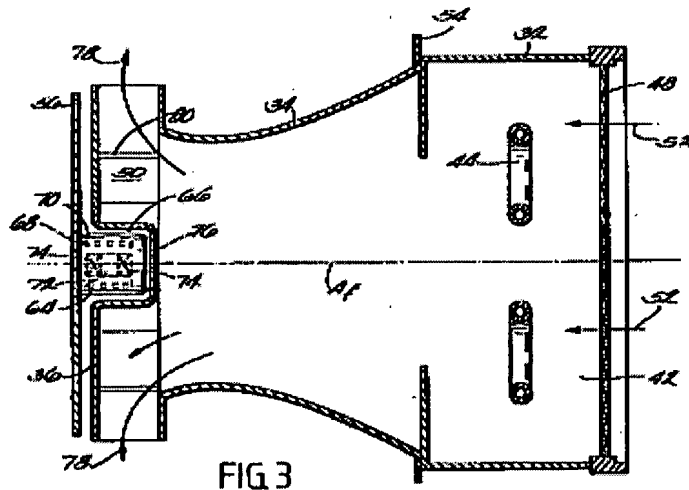
2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

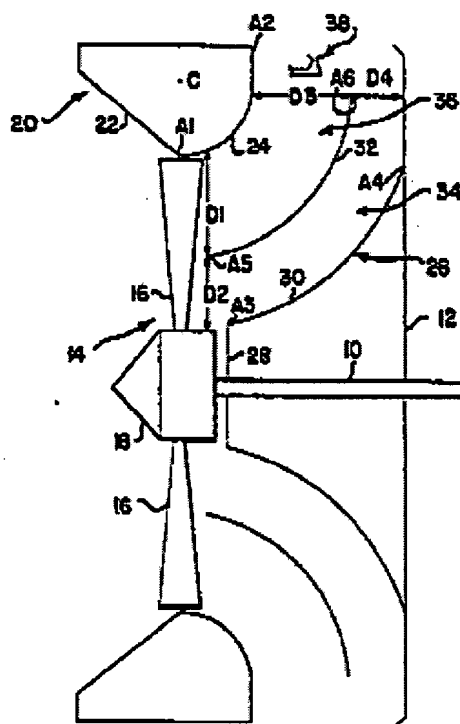
3. Claims 1-16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kendall (US Patent 5,956,383) in view of Rodewald (US Patent 4,634,342).

With respect to claims 1 and 19, Kendall teaches a cooling system for use with an associated x-ray tube assembly (Figs. 2, 3 and 5) comprising:

a heat exchanger (32) which receives cooling fluid from a housing of the associated x-ray tube assembly and transfers heat between the cooling fluid and a flow of air (Figs. 2 and 3; column 3, lines 50-60);



a fan (36) disposed to move the flow of air through the heat exchanger (Fig. 3; column 4; lines 54-59). Kendall is silent about an air flux director positioned to intercept the flow of air from the heat exchanger and to redirect the flow of air in a direction that is generally perpendicular to an axis of rotation of the fan. Rodewald teaches a fan (14) (column 2;



lines 19-24) comprising:

air flux director (26)

positioned to intercept the flow of air and redirect the flow of air in a direction that is generally perpendicular to an axis of rotation of the fan (14) (see Figure; column 2; lines 40-46) providing a configuration which will displace as much air as possible for the consumption of the least amount of power (column 1; lines 7-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the axial fan with the air flux director as suggested by Rodewald in the system of Candall, since such a modification would provide user with the improved x-ray cooling arrangement displacing as much air as possible from the heat exchanger for the consumption of the least amount of power.

With respect to claim 20, Kendall teaches a method for cooling an x-ray tube assembly comprising: receiving a heated cooling liquid from the x-ray tube assembly

through a fluid flow path; transferring heat between the cooling liquid (column 3; lines 50-60) and a flow of air generated by a fan (36), the fan exhausting the air flow in a direction generally parallel with its axis of rotation (column 4; lines 3-13 and 54-59). Kendall is silent about deflecting the exhausted air off of an air flux deflector in a radial direction that is generally perpendicular with the axial direction. Rodewald teaches a method of moving an air with a fan (14) (column 2; lines 19-24) comprising: positioning air flux director (26) to intercept the flow of air and redirect the flow of air in a direction that is generally perpendicular to an axis of rotation of the fan (14) (see Figure; column 2; lines 40-46) providing a configuration which will displace as much air as possible for the consumption of the least amount of power (column 1; lines 7-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to deflect the air with the axial fan and the air flux director as suggested by Rodewald in the method of Kendall, since such a modification would provide user with the capabilities to improve the x-ray cooling arrangement by displacing as much air as possible from the heat exchanger for the consumption of the least amount of power.

With respect to claim 2, Rodewald teaches an axial fan (14) (see Figure).

With respect to claim 3, Rodewald teaches that the air flux director defines a substantially truncated cone with a concave outer surface (see Figure).

With respect to claim 4, Rodewald teaches that the air flux director is spaced from the fan along the rotational axis of the fan (Fig.3).

With respect to claim 5, Rodewald teaches that the air flux director is aligned with the rotational axis of the fan (Fig. 3).

With respect to claim 6, Rodewald teaches that the fan (14) is positioned intermediate an intake section (22) and the air flux director (26) (see Figure).

With respect to claim 7, Rodewald teaches that the fan includes blades (16) that have a diameter, which is less than a maximum outer diameter of the air flux director (see Figure).

With respect to claim 8, Rodewald teaches that the fan (14) includes a shaft (10) associated with a motor director and being mounted to the air flux detector (see Figure).

With respect to claim 9, Rodewald teaches a duct (20 and 22) which receives air and diminishes in cross section toward the air flux director (26) (see Figure).

With respect to claim 10, Rodewald teaches that the fan (14) includes radial blades (16), which are positioned within the duct (20 and 22) (see Figure).

With respect to claim 11, Rodewald teaches that the air flux director (26) defines a truncated cone with a concave outer surface, the duct (22), the fan blades (16), and the air flux director (26) being coaxial (see Figure).

With respect to claim 12, Kendall teaches a second heat exchanger (32b) mounted in parallel with the first heat exchanger (32a); a second fan (36b) disposed to move a second flow of air through the second heat exchanger (32b) but fails to teach a second air flux director. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an additional second air flux director associated with the second fan and positioned to intercept the second flow of air from the second

heat exchanger in order to redirect the second flow of air, since such a modification would provide user with the capabilities to optimize the cooling system of the x-ray tube assembly.

With respect to claim 13, Kendall teaches that at least a first air flux separator (56a and 56b) reducing turbulence created by intermixing of the first and second flows of air (Fig.5; column 5; lines 35-45).

With respect to claim 14, Kendall teaches that the first and second fans are mounted back-to-back (Fig.5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the air flux directors associated with the respective fans mounted back-to-back to improve the x-ray cooling arrangement by displacing as much air as possible from the heat exchanger.

With respect to claim 15, Kendall teaches a second duct; and a second fan (36b), fan blades of the first and second fans, the first and second ducts, being coaxial (Fig.5).

With respect to claim 16, Kendall teaches an assembly comprising: an x-ray tube (12) mounted in a housing; the cooling system (26) (column 3; lines 27-39); and a pump (an inherent part that is commonly used to move the fluid) which circulates the cooling fluid through the housing and the cooling system of claim 1 (column 3; line 50 - column 4; line 2).

With respect to claim 18, Kendall teaches a CT system (10) comprising: a gantry (12) mounted for rotation about a gantry (12) an x-ray tube (14) mounted in a housing; the cooling system (26); and a pump which circulates the cooling fluid through



the housing and the cooling system supported by the gantry; and, an array (16) of x-ray detectors mounted to the gantry (12) opposite to the x-ray tube (14) (see abstract; column 3, lines 4-21).

4. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kendall (US Patent 5,956,383) and Rodewald (US Patent 4,634,342) as applied to claim 16 above, and further in view of McCarthy, JR. (US Patent Application Publication 2004/0022362 A1).

With respect to claim 17, Kendall (column 3, lines 20-40) as modified by Rodewald teaches the conventional well-known CT system with the cooling arrangement but fails to teach that the x-ray tube has a power output of at least 4.5 KW. McCarthy teaches that in a conventional well-known CT system with a cooling arrangement an x-ray tube has power input in order of 1 KW to about 10 KW (see paragraph 0005). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the x-ray tube having the power output at least 4.5 KW as suggested by McCarthy in the apparatus of Kendall as modified by Rodewald in order to generate sufficient X-rays to provide the X-ray CT examination and generate sufficient heat to justify having the cooling system.

### ***Response to Arguments***

5. Applicant's arguments filed October 16, 2007 have been fully considered but they are not persuasive. The applicant argues that the Office action's (mailed

September 16, 2007) suggested modification goes against the teachings of Kendall, and claims are patentable over Kendall (US Patent 5,956,383) and Rodewald (US Patent 4,643,342). Examiner respectfully disagrees. The applicant states that Kandell describes an axial fan, wherein "both the intake and exhaust air streams generated by the fan are directed along the fan axis" (see column 1, lines 33-35). Rodewald teaches completely a different type of axial fan (14) (column 2; lines 19-24) comprising: air flux director (26) to intercept the flow of air and redirect the flow of air in a direction that is generally perpendicular to an axis of rotation of the fan (14) (see Figure; column 2; lines 40-46; that is quite different than directing both the intake and exhaust air streams generated by the fan along the fan axis as described by Kandell. Kandell's and the Applicant's concerns about noise and vibrations associated with first, second and even higher harmonics do not apply to the fan of Rodewald) providing a configuration which will displace as much air as possible for the consumption of the least amount of power (column 1; lines 7-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made to deflect the air with the axial fan and the air flux director as suggested by Rodewald in the method and apparatus of Kendall, since such a modification would provide user with the capabilities to improve the x-ray cooling arrangement by displacing as much air as possible from the heat exchanger for the consumption of the least amount of power. Rejection is proper and stands.

**Conclusion**

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irakli Kiknadze whose telephone number is 571-272-2493. The examiner can normally be reached on 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Irakli Kiknadze  
Examiner  
Art Unit 2882

IK  
November 21, 2007